PORTABLE HIGH SPEED INTERNET ACCESS DEVICE

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Prior Art

The background of the present invention includes US Patent # 5925103, Internet Access Device, which describes an improved Internet access system, vastly different from the present invention. Other prior art would include palm top computers and hand-held computers that have limited processing power due to design restrictions. Thus, these computers are much slower for accessing the Internet and World Wide Web.

Background of the invention

The present invention provides a remote Internet access device with enhanced scrolling features on the device, which is an important aspect of the Internet experience. The result is an Internet access solution with rapid scrolling that occurs locally on the device. A PDA browser software program runs on the device which has its own window, and within this window the web page image is moveable at the device.

Summary

It is an object of the present invention to disclose a portable device that can access the Internet and World Wide Web, at extremely low costs. It is another object of the present invention to provide fast access to parts of a web page received from the Internet, by scrolling locally on the device without communication to a host computer.

The principal embodiment of the present invention discloses a portable device that comprises a modem that connects to a cellular telephone. Thus, the device has a wireless connection to the Internet. A host computer that runs a browser takes information received from the Internet and renders it onto a virtual display in its memory, reduces the color depth of the information to a lower depth color image, then compresses it and sends it to the portable device of the invention, for displaying to the user. Hence, the portable device receives a compressed image, decompresses it, stores it into memory, and displays it for view. Thus, the user views a bit map image of a Web page.

The portable device contains a PDA browser software which runs on the device containing its own window, and within this window the web page image is moveable at the device. Both windows of the browser in the host computer and the PDA browser software are adjustable and may be set to match each other for improved text formatting. The host computer is not involved in the scrolling function as in other devices that allow Internet access. Buttons or icons in the PDA browser window provide web functions and implement scrolling of the web page with respect to this window. The portable device or the host computer may format the width of the image in the browser window of the host computer, i.e. the liquid width of the web page. The size of each web page received from

outside is the same size that is sent to the portable device when converted to an image, and this varies with each web page received. The CPU present in the portable device performs all scrolling functions, with messages sent to the host computer informing of each scroll instruction. This allows the host computer to move its browser window to the newly scrolled area. Icons or buttons in the PDA browser window are mapped to similar icons or buttons in the host computer, such that by clicking on an icon or button in the PDA browser window sends a message to the host computer to click down in the same icon or button in the browser in the host computer. Clicking in an area of the PDA browser window sends a message to the host computer to provide a click down in the same location of the web page, whereby a new web page is loaded, color reduced, compressed and sent to the portable device.

DETAILED DESCRIPTION OF THE DRAWINGS

The invention is described in more detail below with respect to an illustrative embodiment shown in the accompanying drawings in which:

Fig. 1 illustrates elements in the host computer, which communicates with a remote user and the portable device of the invention.

Fig. 2 illustrates the image to be displayed compared with the displayable area of a browser window.

Fig. 3 illustrates a typical subdivision of the image to be displayed.

Fig. 4 illustrates file formats received and sent by the host computer.

Fig. 5 illustrates the PDA browser software and PDA browser window in accordance with the present invention.

Fig. 6 illustrates formatting the liquid width of a web page in accordance with the present invention.

DETAILED DESCRIPTION OF THE PRESENT INVENTION

To facilitate description, any numeral identifying an element in one figure will represent the same element in any other figure.

The principal embodiment of the present invention aims to provide a portable device that allows a user to access the Internet or the World Wide Web (WWW), which is a device similar to a portable computer. It is another aim of the present invention, to provide a method to develop a cost competitive device. It is a further aim of the present invention to provide a means for rapidly scrolling around an image displayed on the portable device.

Currently, existing portable devices such as the Palm Pilot VII and Windows CE type devices contain an operating system, and within the operating system a mini-browser to interpret information received from the WWW or Internet and then display this information on the screen. This requires a powerful microprocessor. Such existing portable devices do not provide rapid scrolling within an opened application program, as each scroll command is sent to the host computer and a refreshed image is sent back to the portable device. This process is slow and tedious unlike the scrolling method performed directly on the portable device of the present invention.

The principal embodiment of the present invention is disclosed in **Figure 1**. A host computer **1** is depicted which is connected to the Internet, and that host computer receives information from outside in the form of HTML or JAVA or other formats, required to generate a web page. Running in the host computer, is a browser program **2** that receives all its information from outside and renders it onto a virtual display in its memory, hence a bitmap is made out of it. When a

remote user **3** requests to view a Web page (or electronic message, etc.) the host computer **1** receives HTML, JAVA, or other types of information from a web server outside the computer (as information may be gathered from a variety of different sources) and the browser program **2** takes all information received from outside and renders it onto a virtual display in its memory. What is therefore rendered in the memory is a web page and this information is directed to another software **4**, which reduces the color depth of the information (i.e. the entire image comprising graphics and text) which is usually received in 24 bit color, subsequently reduced to a black and white bit map or raster image, in the preferred embodiment. Even though text may appear in black and white, the entire image may be 24 bit color which is reduced to black and white. This reduced image is then compressed entirely using a loss-less method of compression by software **11**, implementing G3 or G4 methods in the preferred embodiment. This compressed image is sent through a port in the host computer **1**, in the preferred embodiment, to the cellular telephone **12** of **Fig. 1**, which is connected to the portable high speed internet access device **18** of the invention. The portable device **18**, which contains a display screen **20** with a transparent touch panel and related microelectronics, receives the compressed image, decompresses the image, stores it into internal memory, and displays it for viewing to the user **3**.

In another embodiment, the cellular phone **12** of **Fig. 1** can be replaced by a wire less modem which is connected to the portable high speed internet access device **18** of the invention. This enables the portable device **18** to receive the compressed image, decompresses the image, store it into internal memory, and display it for viewing by the user **3**.

In another embodiment, the cellular phone **12** of **Fig. 1** can be replaced by a LAND line or PSTN which is connected to the portable high speed internet

access device **18** of the invention. This enables the portable device **18** to receive the compressed image, decompresses the image, store it into internal memory, and display it for viewing by the user **3**.

In another embodiment of the invention, after the browser program **2** takes information received from outside and renders it onto a virtual display in its memory, this information is directed to software **4**, whereby the color depth of the information is reduced into a gray scale image. This reduced image is then compressed by software **11** and sent to the portable high speed Internet access device **18** of the invention, for displaying to the user **3**.

In a further embodiment of the invention, after the browser program **2** takes information received from outside and renders it onto a virtual display in its memory, this information is directed to software **4**, whereby the color depth of the information is reduced to any lower depth color image. This reduced image is then compressed by software **11** and sent to the portable high speed Internet access device **18** of the invention, for displaying to the user **3**.

In another embodiment of the invention, the browser program **2** takes information received from outside and renders it onto a virtual display in its memory, but not at the high depth of color as originally received. The browser **2** renders the image in a lower depth of color, such as a black and white image, in the preferred embodiment. Hence, the software **4** is not required for reducing the color depth of the information as the browser program **2** also performs this task. This reduced image is then compressed by software **11** and sent to the portable high speed Internet access device **18** of the invention, for displaying to the user **3**.

In another embodiment of the invention, the browser program **2** takes information received from outside and renders it onto a virtual display in its memory, but not

at the high depth of color as originally received. The browser **2** renders the image in a lower depth of color, such as a gray scale image, in this embodiment. Hence, the software **4** is not required for reducing the color depth of the information as the browser program **2** also performs this task. This reduced image is then compressed by software **11** and sent to the portable high speed Internet access device **18** of the invention, for displaying to the user **3**.

The image **5**, as shown in **Figure 2,** contains the information that would normally be displayed on a single Web page. As can be seen in **Figure 2**, the image **5** of the web page that is rendered by the browser **2** onto a virtual display in its memory is usually larger than the virtual window **6** of the browser. The entire image **5** of the web page is sent to the portable device **18**, to be displayed. The window **6** of the browser **2** running in the host computer **1** is set to be the same size as the display window **19** of the portable device **18**, because the portable device's display window is small, and most likely the web page is larger than the window of the browser in the host computer. The reason for setting the browser's window to be the same size as the portable device's window is for formatting purposes, so that text can be formatted to comfortably fit the size of the web page to be better displayed without being cut off at the left or right edges, making it easy to read. In a regular browser, when the width of the window is reduced some pages are automatically formatted so that they fit left-to-right justified in that window, and the user can view the entire image by only having to scroll up and down, without also having to scroll left-to-right. In many of the pages that are displayed, when they are formatted on the web page they get formatted such that the left-to-right formatting fits within the window of the browser so that the user does not have to scroll left-to-right, but only has to scroll up and down. In the preferred embodiment of the invention, the entire web page which is much larger than both the browser's window and the portable device's window, is rendered onto a virtual display in memory by the browser **2** in the host

computer **1**, the color depth reduced, and the image compressed and sent to the portable device. The portable device receives this image, decompresses it, stores it into memory and displays it to the user.

The host computer receives vector information or compressed data from outside in the form of HTML, JPEG, etc., which is displayed on a web page. That image, in whole or parts, is recompressed and sent to the portable device. The recompressed data format sent to the portable device, is not necessarily in the same format as the compressed data format first received by the host computer, as illustrated in **Fig. 4**. For example, the incoming data from a Web page may be in the form of JPEG which is decompressed and displayed on the browser **2**. This data is recompressed and sent to the portable device but can be in the form of TIFF G4 or other formats, and not necessarily JPEG as initially received.

Another embodiment involves the host computer receiving vector information such as HTML or text and then rasterizing it to bit map format. It can then shown in memory through the virtual browser and is recompressed through a "loss less" method and sent to the portable device.

The image **5** is further divided into sections **7, 8, 9,** and **10,** as shown in **Figure 3**. The image is divided after the bitmap or raster is created. The reason for the division (as will be explained later) is for the purpose of display priority on the user's display. The image **5** is then sent to another program **11** running on the host computer **1 (Fig. 1)**, which compresses the image using a loss-less compression method. The compression method may be group 3 or group 4, or another method. The information is received by a portable device **18** that has the ability to display an image, in its display window **19.** The information is decompressed and displayed in the order of priority such that part of image **7**, which substantially or completely covers the displayable area **19 (Fig. 2)**, of the

portable device is decompressed and displayed first and then sequentially the portions **8, 9, 10** of the image are decompressed and stored in an internal memory of the portable device to be displayed later when the user scrolls up, down, or sideways to these parts of the image.

With further reference to the principle embodiment of the invention in accordance with **Figure 5**, an application program **21** is installed and runs on the portable device **18**. This application program **21** is referred to as the PDA browser software, which has its own window **22**. The PDA browser software window **22** is adjustable in size and may be set to be larger or smaller than the size of the display window **19**, but ideally it is set to be the same size as the display window **19**. As previously mentioned, the window **6** of the browser **2** running in the host computer **1** may be set to be the same size as the display window **19** of the portable device **18**, for formatting purposes. However, in the preferred embodiment the window **6** of the browser **2** running in the host computer **1** is set to be the same size as the PDA browser window **22**. Hence the browser software **2** which takes a web page **23** from the Internet, renders it into memory, reduces the color depth and sends the image compressed to the portable device **18** is much different from the PDA browser software **21** which shows a web page image larger than the size of the PDA browser window **22**. In particular, what the PDA browser software **21** facilitates is scrolling which is performed locally on the portable device **18** without the need for further communication between the device **18** and the host computer **1**, after the image **23** is sent to the portable device. The application program **21**, PDA browser software, runs locally on the portable device **18** whose window **22** is also implemented locally on the portable device, and within this window **22** the web page image **23** is movable at the device. The PDA browser software **21** gets the web page image **23** which was sent by the host computer **1**, and this web page image resides locally in the memory of the portable device **18**. What is unique about the invention here is

that since the image of the web page **23** is shown in the PDA browser window **22**, and the web page is larger than the PDA browser window, the scrolling of the web page is done on the device facilitated by the browser scroll bars **24** or other methods of scrolling. The host computer **1** is not involved in the scrolling function done locally at the portable device **18**. The users **3** would have instantaneous scrolling at their disposal within the PDA browser window **22**. Thus, the scroll bars **24** on the portable device **18** are only used for scrolling around the image locally on the device, and are not connected in any way to any scroll bars that may appear in the browser's window **6** residing in the host computer **1**. Upon initiating a scrolling command on the remote device **18**, a message is sent from the remote device to the host computer **1** informing of the new location the PDA browser window **22** has scrolled to, so that the browser window **6** on the host computer may also scroll to that precise location, though there may be a lag or time difference between the scrolling on the remote device and scrolling on the host computer. Since the scroll commands are sent first to the host computer, any click commands initiated by the user **3** after scrolling would be sent after the scroll commands, subsequently entered on the browser **2** of the host computer **1**. Hence, the browser window **6** of the host computer **1** mirrors the PDA browser window **22**, which are both set to be the same size in the preferred embodiment, so that text can be formatted to comfortably fit the size of the web page displayed inside the PDA browser window **22**, without being cut off at the left or right edges, making it easy to read. Formatting the width of the image in the browser window **6** in the host computer **1** is sometimes referred to as formatting the liquid width of the web page. The liquid width may be preset in the host computer **1.** The portable device **18** may also originally identify the size of the PDA browser window **22** to the host computer **1** so that it may set the liquid width of the web page accordingly. A message may also be sent from the remote device **18** to increase or decrease the liquid width of the web page in the browser window **6** of the host computer **1** to allow text or images to be properly formatted to fit the

PDA browser window **22**. However, some graphics or forms may not fit in the desired liquid width though a substantial portion may be displayed in the PDA browser window **22**. Information on each web page that is sent from the host computer to the portable device may be considered dynamic. Also, the size of each web page received from outside the host computer is dynamic, as the size of all web pages vary in width and length. Thus, the host computer gets a web page from outside and renders this into memory, whereby every web page it receives is of a different size. The size of the web page that is received from the outside is the same size that is sent to the portable device when converted to an image, and it varies with each web page received. Each web page is rendered into memory, reduced in color depth, compressed and sent to the portable device **18** by the host computer **1**. Hence every page received and decompressed by the portable device **18** is of a different size. All of the information that is received by the browser **2** and rendered into memory in the host computer **1** is received from outside the host computer. Consequently, when the liquid width of the browser window **2** is made narrower, the length of the newly formatted web page would increase accordingly. Another way of doing this, in accordance with **Figure 6**, is to set the size of the browser window **6** to be larger than most web pages **23**. The host computer **1** also sets the liquid width of the web page **23**, which is preset in the host computer to be the same width of the PDA browser window **22** on the portable device **18**. Hence, the browser **2** is instructed to artificially format whatever it can to the desired liquid width. In performing this task, a substantial part of the image of the web page may be shown on the PDA browser window **22** of the portable device, without having to frequently scroll horizontally on the portable device as most text portions fit in the PDA browser window **22**. However, certain graphics portions or headers may not fit in the PDA browser window **22** and horizontal scrolling may be required in these areas occasionally. Vertical scrolling is usually required.

With further reference to the preferred embodiment of the invention and **Figure 5**, a CPU resident in the portable device **18** therefore has the ability to decompress a bit map or raster image that may be larger than the size of the PDA browser window **22** and allows the user to traverse this bit map or raster image locally on the portable device. The primary method of traversing the image is through conventional scroll bars **24** positioned at the sides of the image inside the display screen **19** at the edges of the PDA browser window **22**. However, buttons or icons residing outside the display screen **19** may also be used to scroll on the portable device, to enable the user to move the web page **23** relative to the PDA browser window **22** on the portable device **18**. The CPU present in the portable device performs all scrolling functions, even though messages are sent to the host computer informing it of each scroll instruction. This allows the host computer to keep a track of the location of the portable device's PDA browser window **22** with respect to the web page. For every new web page transferred to the portable device, only the contents of the browser window **6** are transferred. Other items such as the title, scroll bars, menu items, icons, etc., are not sent to the portable device. In particular, a fixed area **25** exists inside the PDA browser window **22** at the top, which contains icons and an address input area which are not moveable. These icons and menu items are implemented on the portable device, and are sent once by the host computer to the portable device each time the device is powered on and initialized. Once the portable device receives the layout of these icons and menu items, they are stored into memory and displayed on the screen. Icons that exist in area **25** are typically back, forward, refresh, stop, go, etc., which are commonly used in regular internet browsers. Each of these ions in area **25** is mapped to similar corresponding icons which may be at different locations on the browser **2** in the host computer **1**, such that by the user **3** clicking on any icon in area **25**, a message is sent to the host computer informing it of the click location, and that click is implemented in the corresponding location on the browser **2**, and a

refreshed image is received by the browser **2** from outside and this is sent to the portable device **18**, to be displayed in the PDA browser window **22**. Similarly, text characters inputted in the text input area inside area **25** are sent as messages to the host computer which inputs these text characters in the corresponding text input area on the browser **2**, which receives a refreshed image after the "go" or "enter" icon is clicked on the remote device **18.**

In another embodiment, the layout of these icons and menu items in area **25** are hard coded in the memory of the portable device. Each time the device is powered on and initialized, these icons and menu items are retrieved from memory and displayed at the top of the PDA browser window **22**, without any communication from the host computer.

With further reference to **Figure 5,** the portable device **18** contains a fixed area **25** at the top of the PDA browser window **22**, which is not moveable. Within area 25 the following icons are present and their respective functions described herein. Clicking on the "back" icon **26** on the portable device **18** sends a message to the host computer **1** to click on the corresponding "back" icon on the browser **2,** which sends the previously displayed web page to the portable device. Clicking on the "forward" icon **27** on the portable device **18** sends a message to the host computer **1** to click on the corresponding "forward" icon on the browser **2**, which sends the corresponding web page to the portable device. Clicking on the "stop" icon **28** on the portable device **18** sends a message to the host computer **1** to click on the corresponding "stop" icon on the browser **2,** thus the host computer stops receiving the current web page from outside and also stops any transmission of a web page to the remote device. The image sent prior to clicking the "stop" icon **28** would remain on the display screen **19.** Clicking on the "refresh" icon **30** on the portable device **18** sends a message to the host computer **1** to click on the corresponding "refresh" icon on the browser

2, which receives a refreshed image from outside and sends it to the portable device. Clicking on the "home" icon **32** on the portable device **18** sends a message to the host computer **1** to click on the corresponding "home" icon on the browser **2,** which receives a refreshed home web page from outside and sends it to the portable device. Clicking on the "address input area" **29** on the portable device **18** automatically invokes a keyboard layout which is displayed inside the PDA browser window **22.** When the user clicks on any text character on the keyboard it is processed by the CPU on the portable device and the corresponding text character appears inside the "address input area" **29**. Upon clicking on the "go" icon **33** on the portable device **18,** a message is sent to the browser **2** in the host computer **1** to go to the address that was last typed in the "address input area" **29** on the portable device **18**. A refreshed web page is received from outside and is sent by the host computer **1** to the portable device **18.** Clicking on the keyboard icon **31** on the portable device **18** invokes a keyboard layout, which is displayed inside the PDA browser window **22** to facilitate entry of characters that appear on the keyboard layout. When the keyboard layout is displayed inside the PDA browser window **22,** clicking on the keyboard icon **31** on the portable device **18** would minimize the keyboard layout, removing it from the PDA browser window **22.**

In a further embodiment of the invention, when the user clicks on an image of a web page on the screen of the portable device **18,** a message is sent to the host computer **2** informing it of the exact click location relative to the PDA browser window **22**, but the host computer already knows where the PDA browser window **22** is relative to the web page, as the previous scrolling action would have sent a message to the host computer informing where the PDA browser window **22** has scrolled to relative to the web page. If there was no scrolling action, the host computer would know the exact location of the PDA browser window **22** with respect to the web page, as this is where the first set of

compressed data was sent to the portable device **18** from the host computer **1**. This allows the host computer to deduce exactly where the click location occurred on the remote device **18** relative to the web page.